

#### **104.10 - Light Stable Isotopic Materials (gas, liquid and solid forms)**

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For further information see: [SP260-149](#)

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SRM Description	8529	8535a	8536	8537	8539	8540	8541	8542	8543	8544	8545	8546	8547	8548	8549	8550
Unit Size	IAEA S-3 (Sulfur Isotopes in Silver Sulfide) (1 bottle x 0.5g)	VSMOW2 Vienna Standard Mean Ocean Water (20 mL)	SLAP-Water Standard GSP-Water (20 mL)	NBS Light Stable Isotopic Standard (20 mL)	PEFI-Polyethylene Foil (1 mL)	USGS24-Graphite (mg)	Sucrose ANU-Sucrose (0.8 g)	NBS18-Carbonate (1 g)	NBS19-Limestone (0.4 g)	LSVEC-Lithium Carbonate (0.4 g)	NBS28-Silica Sand (0.4 g)	IAEAN1-Ammonium Sulfate (0.4 g)	IAEAN2-Ammonium Sulfate (0.4 g)	IAEAN3-Nitrogen and Oxygen Isotopes in Nitrate (0.4 g)	USGS25-Ammonium Sulfate (0.5 g)	
(see Certificate of Analysis for uncertainties and other details)																
$\delta^{13}\text{C}_{\text{VPDB}}$ x 1000	-30.03 Ref [5]	-32.15 Ref [5]	-16.05 Ref [5]	-10.45 Ref [5]	-5.01 Ref [5]	+1.95* Ref [16]	-46.6* Ref [5]							+0.43* Ref [7]	+20.41 Ref [7]	+4.7 Ref [7]
$\delta^{15}\text{N}_{\text{Air}}$ x 1000															-30.41 Ref [7]	
$\Delta^{17}\text{O}_{\text{SMOW}}$															-0.2 Ref [7]	
$\delta^{18}\text{O}_{\text{VPDB}}$ x 1000						-23.01 Ref [14]	-2.2* Ref [16]	-26.41 Ref [14]								
$\delta^{18}\text{O}_{\text{VSMOW}}$ x 1000	-24.78 Ref [2]	-55.5* Ref [1]				+7.20 Ref [15]	+28.65 Ref [15]	+3.69 Ref [15]	+9.58 Ref [2]					+25.6 Ref [8]		
$\delta^{\text{H}}_{\text{VSMOW}}$ x 1000	-189.5 Ref [2]	-428* Ref [1]	-116.9 Ref [3]	-100.3 Ref [2]												
$\delta^{30}\text{Si}_{\text{NBS28}}$ x 1000														0* Ref [12]		
$\delta^{34}\text{S}_{\text{CDT}}$ x 1000	-32.49															
$\delta\text{Li}/\text{Li}$														0.08215** Ref [4]		

\* Exact values defining the delta scale.

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 ^ Interim consensus values used for scale normalization

\*\*Absolute isotope amount ratio

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8551	8552	8553	8554
USGS26-Ammonium Sulfate (0.5 g)	NSVEC-Gaseous Nitrogen (300 $\mu$ mol)	Soufre De Lacq-Elemental Sulfur (0.5 g)	NZ1-Silver Sulfide (0.5 g)
+53.75 Ref [7]	-2.78 Ref [7]		
+16.86 Ref [10]	-0.3* Ref [11]		

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Unit Size	NZ2-Silver Sulfide (0.5 g)	NBS123-Sphalerite (1.5 g)	NBS127-Barium Sulfate (0.5 g)	USGS32 Nitrogen and Oxygen Isotopes in Nitrate (0.9 g)	Natural Gas, Coal Origin (cyl)	Natural Gas, Biogenic (cyl)	CO <sub>2</sub> -Heavy, Paleomarine Origin (set (2))	CO <sub>2</sub> -Light, Petrochemical Origin (set (2))	CO <sub>2</sub> -Biogenic, Modern Biomass Origin (set (2))	USGS34 Nitrogen and Oxygen Isotopes in Nitrate (0.9 g)	USGS35 Nitrogen and Oxygen Isotopes in Nitrate (0.9 g)	USGS40/Light Carbon and Nitrogen Isotopes in L-glutamic Acid (1 g)	L-glutamic Acid USGS41 (Heavy Carbon and Nitrogen Isotopes in L-glutamic Acid) (0.5 g)

(see Certificate of Analysis for uncertainties and other details)

$\delta^{13}\text{C}_{\text{VPDB}} \times 1000$	-29.0(CH <sub>4</sub> ) Ref [3]	-72.8(CH <sub>4</sub> ) Ref [3]	-3.72 Ref [5]	-41.59 Ref [5]	-10.45 Ref [5]		-26.39 Ref [12]	+37.63 Ref [12]
$\delta^{15}\text{N}_{\text{Air}} \times 1000$	+180 Ref [7]					-1.8 Ref [8]	+2.7 Ref [8]	-4.52 Ref [1,2] +47.57 Ref [1,2]
$\Delta^{17}\text{O}_{\text{VSMOW}}$						-0.1	+21.6 Ref [17]	
$\delta^{18}\text{O}_{\text{VPDB}} \times 1000$		-18.49 Ref [14] [14]	-33.52 Ref [14]	-10.09 Ref [14]				
$\delta^{18}\text{O}_{\text{VSMOW}} \times 1000$	8.59 Ref [8]	+25.7 Ref [8]	+11.86 Ref [15] [15]	-3.64 Ref [15]	+20.52 Ref [15]	-27.9 Ref [8]	+57.5 Ref [8]	
$\delta^2\text{H}_{\text{VSMOW}} \times 1000$		-138(CH <sub>4</sub> ) Ref [3]	-176(CH <sub>4</sub> ) Ref [3]					
$\delta^{28}\text{Si}_{\text{NBS28}} \times 1000$								
$\delta^{34}\text{S}_{\text{VCDT}} \times 1000$	+22.62 Ref [12]	+17.09 Ref [13] [12]	21.17 Ref [12]					
$\delta_{\text{Li}}/\text{Li}$								

\* Exact values defining the delta scale

<sup>a</sup> Interim consensus values used for scale normalization

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